

CLAIMS

1. A catalyst composition comprising:
 - (a) a rhodium component present in an amount such that the catalyst composition comprises less than 3.0% of rhodium by weight of the total catalyst composition; and
 - (b) an indium component present in an amount such that the catalyst composition comprises at least 0.3% and less than 5.0% of indium by weight of the total catalyst composition.
2. The catalyst composition of claim 1 and comprising at least 0.25% and less than 2.5% of rhodium by weight of the total catalyst composition.
3. The catalyst composition of claim 1 and comprising at least 0.3% and less than 1.5% of rhodium by weight of the total catalyst composition.
4. The catalyst composition of claim 1 and comprising at least 0.4% and less than 4.0% of indium by weight of the total catalyst composition.
5. The catalyst composition of claim 1 and comprising at least 0.5% and less than 3% of indium by weight of the total catalyst composition.
6. The catalyst composition of claim 1 wherein the molar ratio of rhodium to indium is about 0.2 to about 1.1.
7. The catalyst composition of claim 1 wherein the molar ratio of rhodium to indium is about 0.35 to about 0.75.
8. The catalyst composition of claim 1 and also comprising a support.
9. The catalyst composition of claim 1 wherein the support is selected from alumina, zirconia and ceria/alumina.

10. The catalyst composition of claim 1 wherein the catalyst composition has been treated in a reducing atmosphere at a temperature of least 300°C.

11. A method for making a catalyst composition, the method comprising:

- (a) applying a rhodium compound to a support; and
- (b) applying an indium compound to the support;

to produce a catalyst composition which comprises less than 3.0% of rhodium and at least 0.3% and less than 5.0% of indium by weight of the total catalyst composition including the support.

12. The method of claim 11 wherein the rhodium compound and the indium compound are applied to the support concurrently.

13. The method of claim 11 wherein the rhodium compound and the indium compound are applied to the support consecutively.

14. The method of claim 11 wherein at least one of the compounds is applied to the support by impregnating the support with a solution of the compound.

15. The method of claim 11 wherein at least one of the compounds is applied to the support by precipitating the compound from a solution containing ions of at least one of rhodium and indium.

16. The method of claim 11 wherein the rhodium compound is rhodium nitrate.

17. The method of claim 11 wherein the indium compound is indium nitrate or indium formate.

18. The method of claim 11 wherein support is selected from alumina, zirconia and ceria/alumina.

19. The method of claim 11 and further including, after at least one of (a) and (b), calcining the support at a temperature of about 100°C to about 600°C.
20. The method of claim 11 and further including, after (a) and (b), treating the support in a reducing atmosphere at a temperature of about 100°C to about 600°C.
21. The method of claim 20 wherein said treating the support is conducted at a temperature of about 300°C to about 500°C.
22. A process for selectively removing alkynes or diolefins from a feedstock also containing olefins, the process comprising contacting the feedstock with hydrogen in the presence of a catalyst composition made by the method of claim 11.
23. A process for selectively removing C₂ to C₄ alkynes or diolefins from a feedstock also containing C₂ to C₄ olefins, the process comprising contacting the feedstock with hydrogen in the presence of a catalyst composition comprising a rhodium component and an indium component, and the process producing an olefin-enriched product stream containing less than 20 weight % of oligomers of said olefins.
24. The process of claim 23 and producing an olefin-enriched product stream containing less than 10 weight % of oligomers of said olefins.

25. A process for selectively removing alkynes or diolefins from a feedstock also containing olefins, the process comprising contacting the feedstock with hydrogen in the presence of a catalyst composition comprising:

(a) a rhodium component present in an amount such that the catalyst composition comprises less than 3.0% of rhodium by weight of the total catalyst composition; and

(b) an indium component present in an amount such that the catalyst composition comprises at least 0.3% and less than 5.0% of indium by weight of the total catalyst composition.

26. The process of claim 25 wherein the alkynes or diolefins have 2 to 4 carbon atoms and the feedstock also contains C₂ to C₄ olefins

27. The process of claim 25 wherein said contacting is conducted at a temperature of from about 20°C to about 150°C, a pressure of from about 690 kPa to about 4100 kPa, and a molar ratio of hydrogen to alkynes and diolefins of from about 1 to about 1000.

28. The process of claim 25 wherein said contacting is conducted at a temperature of from about 30°C to about 100°C, a pressure of from about 1400 kPa to about 3400 kPa, and a molar ratio of hydrogen to alkynes and diolefins of from about 1.1 to about 800.

29. The process of claim 25 wherein at least one of the feedstock and the hydrogen contains carbon monoxide in an amount up to 1 ppm.

30. The process of claim 25 wherein at least one of the feedstock and the hydrogen contains carbon monoxide in an amount up to 0.5 ppm.